GENERATION II SOLUTIONS

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STEP 1 Install the SE2 System

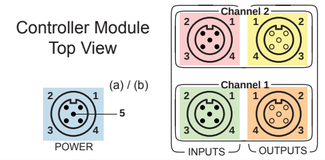
Before starting the setup procedure for your SE2 System, refer to the SE2 User's Manual supplied with your system to:

- Mount the SE2 System components (Controller Module, Sensing Module, Electrode).
- Establish the Air Service Connection.
- Interconnect all the SE2 System components (Controller Module, Sensing Module, Electrode).

Note: In STEPS 2, 3, and 4 that follow, table cells are color coordinated. White cells are applicable to all configurations (Digital I/O, DeviceNet, Profibus, EtherNet/IP).

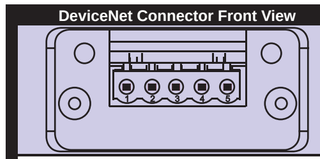
STEP 2 Wire the SE2 System (all configurations). Establish the network communication connections (for DeviceNet, Profibus, EtherNet/IP configurations only).

- Power requirements: 24VDC +/-10% ~220mA (with I/O in the sinking mode).
- PNP, NPN, or Auto-Detect inputs (2 per channel) 24VDC +/-10%.
- PNP or NPN outputs (4 per channel) 24VDC +/-10% Max. 220 mA.



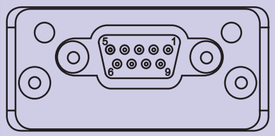
	Connector (M12-Micro)	Pin	Wire Color	Description	Function	Notes
Power	**POWER connector** (5-pin male) [a] / [b] **Power Connection**	1	Brown	+24VDC	+24 VDC [b]	Required
		2	White	Output 5	Weld Proceed CH 2 [c]	Required if equipped
		3	Blue	0 VDC	0 VDC [b]	Required
		4	Black	Output 1	Weld Proceed CH 1 [c]	Required
		5 [a]	Grey	Equipment GND	Equipment GND [b]	Required
Channel 1	**CH1 OUTPUT connector** (4-pin female) **Outputs**	1	Brown	Output 2	Pin Returned CH 1 [c]	Required
		2	White	Output 3	Learn Active CH 1 [c]	Suggested
		3	Blue	0 VDC	0 VDC	
		4	Black	Output 4	Weld Accept CH 1 [c]	Suggested
	CH1 INPUT connector (4-pin male) **Inputs**	1	Brown	Unused	Unused	N/A
		2	White	Input 1	Weld Start CH 1 [d]	Required
		3	Blue	0 VDC	0 VDC	
		4	Black	Input 2	Remote Learn CH 1 [d]	Suggested
Channel 2	**CH2 OUTPUT connector** (4-pin female) **Outputs**	1	Brown	Output 6	Pin Returned CH 2 [c]	Required if equipped
		2	White	Output 7	Learn Active CH 2 [c]	Suggested if equipped
		3	Blue	0 VDC	0 VDC	
		4	Black	Output 8	Weld Accept CH 2 [c]	Suggested if equipped
	CH2 INPUT connector (4-pin male) **Inputs**	1	Brown	Unused	Unused	N/A
		2	White	Input 3	Weld Start CH2 [d]	Required if equipped
		3	Blue	0 VDC	0 VDC	
		4	Black	Input 4	Remote Learn CH 2 [d]	Suggested if equipped

DeviceNet Connector Front View



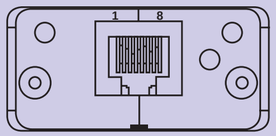
Pin	Signal	Description	Wire Color
1	V-	Negative bus supply voltage	Black
2	CAN_L	CAN low bus line	Blue
3	SHIELD	Cable shield	Shield
4	CAN_H	CAN high bus line	White
5	V+	Positive bus supply voltage	Red

Profibus Connector Front View



Pin	Signal	Description
1, 2, 7, 9	-	Unused
3	B Line	Positive RxD/TxD, RS485 level
4	RTS	Request to send
5	GND Bus	Ground (isolated)
6	+5V Bus Output	+5 V termination power (isolated)
8	A Line	Negative RxD/TxD, RS485 level
Housing	Cable Shield	Internally connected to the Communication Module protective earth via cable shield filters according to the PROFIBUS standard.

Ethernet / IP Front View



Pin	Wire Color	Name
1	White Green	TX+ / RX+
2	Green	TX- / RX-
3	White Orange	RX+ / TX+
4	Blue	Unused
5	White Blue	Unused
6	Orange	RX- / TX-
7	White Brown	Unused
8	Brown	Unused

(a) Important: If power connector is 4 pin, the controller case needs to have an equipment GND attached.

(b) For network communication (DeviceNet, Profibus, EtherNet/IP), only the power connection is required. Pins 1, 3, and 5 are used.

(c) By changing the setup in the **Advanced** menu, you can select **NPN** output function (see **Main Menu > Advanced > Digital Outputs > Output Type**).

(d) There are two inputs per channel that are configurable, with three options to choose from. They can be assigned to **Remote Learn**, **Remote Bypass**, or **Weld Start** under the **Main Menu > Advanced > Digital Inputs > Input Assignment**.

STEP 3 Program the SE2 Inputs and Monitoring Device Outputs (For all configurations: Digital, DeviceNet, Profibus, EtherNet/IP) *

Digital Communication	Network Communication Word	Byte	Bit	SE2 Display	Description	Monitoring Device Output Programming Considerations
Disabled	1	1	0	0	Remote Bypass Channel 1	Set this bit to 0 for normal operations. Set this bit to 1 to bypass the system. "Pin Returned", "Weld Proceed", and "Weld Accept" outputs are forced ON. ***Note:*** May allow for a fastener in the incorrect condition to be welded; parts should be 100% inspected if this bit is set to 1.
IN 1	1	1	1	1	Weld Start Input Channel 1	If assigned (for Digital I/O configurations) or enabled (for industrial communications), set this bit to 1 when the Weld Proceed Position is 1, weld pressure has been achieved, and approx. 100 ms before passing weld current. The bit should remain set to 1 for 50 ms or longer and reset to 0 before the next weld. If disabled (Digital I/O) or not enabled (industrial communication), false triggering of PASS/SUSPECT is possible by loading parts or applying weld pressure.
IN 2	1	1	2	2	Remote Learn Channel 1	Ensure that the weld pin is returned. Select Channel 1 and the schedule to be learned, either manually or using the "Schedule Select" bits below (4, 5, 6, 7) if using DeviceNet, Profibus, or EtherNet/IP. Set this bit to 1 for 50 ms or longer to activate the "Learn" mode. ***Note:*** If the selected schedule changes or is turned OFF before the "Learn" process is complete, the "Learn" will be aborted.
	1	1	3	3	Weld Start Enable Channel 1	Set this bit to 1 if using "Weld Start Input".
	1	1	4	4	Schedule Select (bit 1) Channel 1 **	Binary schedule select (1 – 8 schedules). Before you start the weld, select the schedule desired by setting the corresponding binary bits to 1. Leave the bits at 1 until the weld has been completed.
	1	1	5	5	Schedule Select (bit 2) Channel 1 **	Binary schedule select (1 – 8 schedules). See description in Word 1 / Bit 4.
	1	1	6	6	Schedule Select (bit 4) Channel 1 **	Binary schedule select (1 – 8 schedules). See description in Word 1 / Bit 4.
	1	1	7	7	Schedule Select (bit 8) Channel 1 **	Binary schedule select (1 – 8 schedules). See description in Word 1 / Bit 4.
Disabled	1	2	8	8	Remote Bypass Channel 2	Set this bit to 0 for normal operations. Set this bit to 1 to bypass the system. "Pin Returned", "Weld Proceed", and "Weld Accept" outputs are forced ON. ***Note:*** May allow a fastener in the incorrect condition to be welded; parts should be 100% inspected if this bit is set to 1.
IN 3	1	2	9	9	Weld Start Input Channel 2	If assigned (for Digital I/O configurations) or enabled (for industrial communications), set this bit to 1 when the Weld Proceed Position is 1, weld pressure has been achieved, and approx. 100 ms before passing weld current. The bit should remain set to 1 for 50 ms or longer and reset to 0 before the next weld. If disabled (Digital I/O) or not enabled (industrial communication), false triggering of PASS/SUSPECT is possible by loading parts or applying weld pressure.
IN 4	1	2	10	A	Remote Learn Channel 2	Ensure that the weld pin is returned. Select Channel 2 and the schedule to be learned, either manually or using the "Schedule Select" bits below (C, D, E, F) if using DeviceNet, Profibus, or EtherNet/IP. Set this bit to 1 for 50 ms or longer to activate the "Learn" mode. ***Note:*** If the selected schedule changes or is turned OFF before the "Learn" process is complete, the "Learn" will be aborted.
	1	2	11	B	Weld Start Enable Channel 2	Set this bit to 1 if using "Weld Start Input".
	1	2	12	C	Schedule Select (bit 1) Channel 2 **	Binary schedule select (1 – 8 schedules). Before you start the weld, select the schedule desired by setting the corresponding binary bits to 1. Leave the bits at 1 until the weld has been completed.
	1	2	13	D	Schedule Select (bit 2) Channel 2 **	Binary schedule select (1 – 8 schedules). See description in Word 1 / Bit 12.
	1	2	14	E	Schedule Select (bit 4) Channel 2 **	Binary schedule select (1 – 8 schedules). See description in Word 1 / Bit 12.
	1	2	15	F	Schedule Select (bit 8) Channel 2 **	Binary schedule select (1 – 8 schedules). See description in Word 1 / Bit 12.

Notes for STEP 3 and STEP 4:

* DeviceNet, Profibus, EtherNet/IP – 6 bytes inputs, 2 bytes outputs. Communication Rate: Auto Baud.

** Refer to the "Binary Schedule Select" table in the upper right-hand corner of this page.

STEP 4 Program the SE2 Outputs and Monitoring Device Inputs (For all configurations: Digital, DeviceNet, Profibus, EtherNet/IP) *

Digital Communication	Network Communic. Word	Byte	Bit	SE2 Display	Description	Monitoring Device Input Programming Considerations
OUT 2	1	1	0	0	Pin Return Channel 1	Bit is set to 1 when the weld pin is at returned position (fully extended). Suggest generating a fault if the input is 0 (for one second) when the upper electrode is returned and the welded part has been removed or an un-welded part is present and binding on the pin.
	1	1	1	1	Not Used	
OUT 1	1	1	2	2	Weld Proceed Channel 1	Bit is set to 1 when the fastener is in the correct orientation and the projections are against the stamping. Bit is reset to 0 when the pin is returned. Suggest generating a fault if you advance the upper electrode and the input is 0 for 1.5 seconds.
OUT 4	1	1	3	3	Weld Accept Channel 1	Bit is set to 1 when the weld performed matches the learned schedule (comparing "Set-Down" and "Set-Down Sigma"). Bit is reset to 0 after approx. 0.5 seconds. Generate a user fault if the weld is completed and the input is 0. See "Set-Down Alarm" and "Set-Down Sigma Alarm" below.
	1	1	4	4	Not Used	
	1	1	5	5	Not Used	
OUT 3	1	1	6	6	Learn Active Channel 1	Bit is set to 1 when the SE2 is in "Learn" mode. The input will reset to 0 after a successful learn, if the schedule selection is changed or turned OFF before "Learn" is complete, or when power is cycled. Suggest generating a fault if the input is 1 after "Max. Learn Welds" number is reached in "Learn Setup" (default is 5). See Main Menu > Advanced > Learn Setup > Max. Learn Welds.
	1	1	7	7	Selected Schedule not Learned Channel 1	Bit default status is 0; it is set to 1 to inform when the selected schedule has not been learned.
	1	2	8	8	Not Used	
	1	2	9	9	Set-Down Sigma Alarm Channel 1	Bit default status is 0; it is set to 1 if "Set-Down Sigma" is ON in the schedule and the "Max. Consecutive Fails" value is reached (default is 3). See Main Menu > Advanced > Setdown Sigma > Max. Consecutive Fails. For specific information, generate a user message.
	1	2	10	A	Not Used	
	1	2	11	B	Set-Down Alarm Channel 1	Bit default status is 0. If this bit is 1, signifies that the weld was not set-down relative to the learned schedule and the weld is suspect. For specific information, generate a user message.
	1	2	12	C	Schedule Report (bit 1) Channel 1 **	Schedule select handshake information. These bits should correspond to the currently selected SE2 schedule for channel 1.
	1	2	13	D	Schedule Report (bit 2) Channel 1 **	Schedule select handshake information. These bits should correspond to the currently selected SE2 schedule for channel 1.
	1	2	14	E	Schedule Report (bit 4) Channel 1 **	Schedule select handshake information. These bits should correspond to the currently selected SE2 schedule for channel 1.
	1	2	15	F	Schedule Report (bit 8) Channel 1 **	Schedule select handshake information. These bits should correspond to the currently selected SE2 schedule for channel 1.
OUT 6	2	1	0	0	Pin Return Channel 2	Bit is set to 1 when the weld pin is at returned position (fully extended). Suggest generating a fault if the input is 0 (for one second) when the upper electrode is returned and the welded part has been removed or an un-welded part is present and binding on the pin.
	2	1	1	1	Not Used	
OUT 5	2	1	2	2	Weld Proceed Channel 2	Bit is set to 1 when the fastener is in the correct orientation and the projections are against the stamping. Bit is reset to 0 when the pin is returned. Suggest generating a fault if you advance the upper electrode and the input is 0 for 1.5 seconds.
OUT 8	2	1	3	3	Weld Accept Channel 2	Bit is set to 1 when the weld performed matches the learned schedule (comparing "Set-Down" and "Set-Down Sigma"). Bit is reset to 0 after approx. 0.5 seconds. Generate a user fault if the weld is completed and the input is 0. See "Set-Down Alarm" and "Set-Down Sigma Alarm" below.
	2	1	4	4	Not Used	
	2	1	5	5	Not Used	
OUT 7	2	1	6	6	Learn Active Channel 2	Bit is set to 1 when the SE2 is in "Learn" mode. The input will reset to 0 after a successful learn, if the schedule selection is changed or turned OFF before "Learn" is complete, or when power is cycled. Suggest generating a fault if the input is 1 after "Max. Learn Welds" number is reached in "Learn Setup" (default is 5). See Main Menu > Advanced > Learn Setup > Max. Learn Welds.
	2		7	7	Selected Schedule not Learned Channel 2	Bit default status is 0; it is set to 1 to inform when the selected schedule has not been learned.
	2	2	8	8	Not Used	
	2	2	9	9	Set-Down Sigma Alarm Channel 2	Bit default status is 0; it is set to 1 if "Set-Down Sigma" is ON in the schedule and the "Max. Consecutive Fails" value is reached (default is 3). See Main Menu > Advanced > Setdown Sigma > Max. Consecutive Fails. For specific information, generate a user message.
	2	2	10	A	Not Used	
	2	2	11	B	Set-Down Alarm Channel 2	Bit default status is 0. If this bit is 1, signifies that the weld was not set-down relative to the learned schedule and the weld is suspect. For specific information, generate a user message.
	2	2	12	C	Schedule Report (bit 1) Channel 2 **	Schedule select handshake information. These bits should correspond to the currently selected SE2 schedule for channel 2.
	2	2	13	D	Schedule Report (bit 2) Channel 2 **	Schedule select handshake information. These bits should correspond to the currently selected SE2 schedule for channel 2.
	2	2	14	E	Schedule Report (bit 4) Channel 2 **	Schedule select handshake information. These bits should correspond to the currently selected SE2 schedule for channel 2.
	2	2	15	F	Schedule Report (bit 8) Channel 2 **	Schedule select handshake information. These bits should correspond to the currently selected SE2 schedule for channel 2.
	3	1	0	0	PR & WP Internally Bypassed Channel 1	Bit default status is 0; it is set to 1 when the "Pin Return" and "Weld Proceed" have been bypassed using the controller interface. ***Note:*** May allow for a fastener in the incorrect condition to be welded; parts should be 100% inspected if this output is ON.
	3	1	1	1	WA Internally Bypassed Channel 1	Bit default status is 0; it is set to 1 when the "Weld Accept" has been bypassed using the controller interface. This ignores the final welded position of the fastener.
	3	1	2	2	Not Used	
	3	1	3	3	Not Used	
	3	1	4	4	Not Used	
	3	1	5	5	Not Used	
	3	1	6	6	Not Used	
	3	1	7	7	Not Used	
	3	2	8	8	PR & WP Internally Bypassed Channel 2	Bit default status is 0; it is set to 1 when the "Pin Return" and "Weld Proceed" have been bypassed using the controller interface. ***Note:*** May allow for a fastener in the incorrect condition to be welded; parts should be 100% inspected if this output is ON.
	3	2	9	9	WA Internally Bypassed Channel 2	Bit default status is 0; it is set to 1 when the "Weld Accept" has been bypassed using the controller interface. This ignores the final welded position of the fastener.
	3	2	10	A	Not Used	
	3	2	11	B	Not Used	
	3	2	12	C	Not Used	
	3	2	13	D	Not Used	
	3	2	14	E	Not Used	
	3	2	15	F	Not Used	

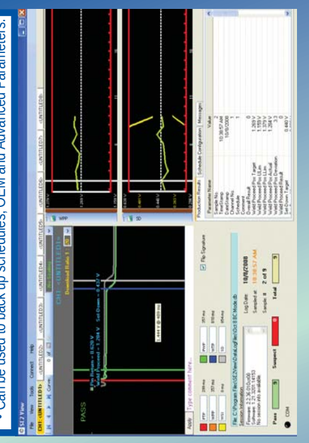
Continue on the reverse

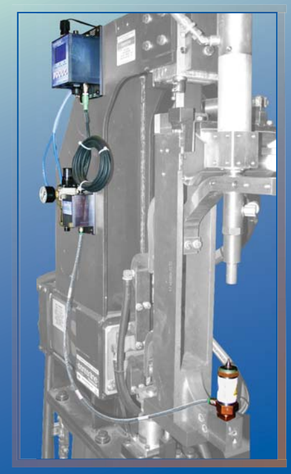
BINARY SCHEDULE SELECT

Binary Bit #	1	2	4	8
Schedule 1	1	0	0	0
Schedule 2	0	1	0	0
Schedule 3	1	1	0	0
Schedule 4	0	0	1	0
Schedule 5	1	0	1	0
Schedule 6	0	1	1	0
Schedule 7	1	1	1	0
Schedule 8	0	0	0	1

Ask us about the SE2 View Software:

- Indicates trends for Weld Proceed and Set-Down.
- Captures information for all eight schedules.
- Can be used to back up schedules, OEM and Advanced Parameters.





SE2 System is protected by U.S. patents # 6,576,859; 6,750,419; 6,906,279; 7,282,664; 7,564,005 with other U.S. and foreign patents pending.

GENERATION II SOLUTIONS

CenterLine (Windsor) Limited
655 Morton Dr., Windsor, ON, N9J 3T9
P.O. Box 321187, Detroit, MI 48232-1187
• Toll Free (800) 268-8330
• Can. (519) 734-8330
• U.S. (313) 961-3731
• Fax (519) 734-2006
Email: info@cntrline.com

www.cntrline.com

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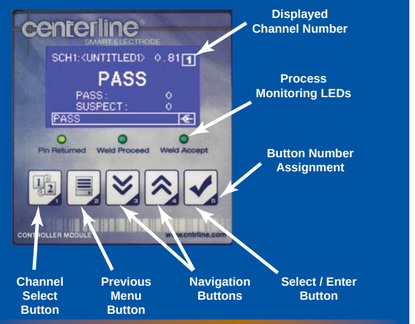
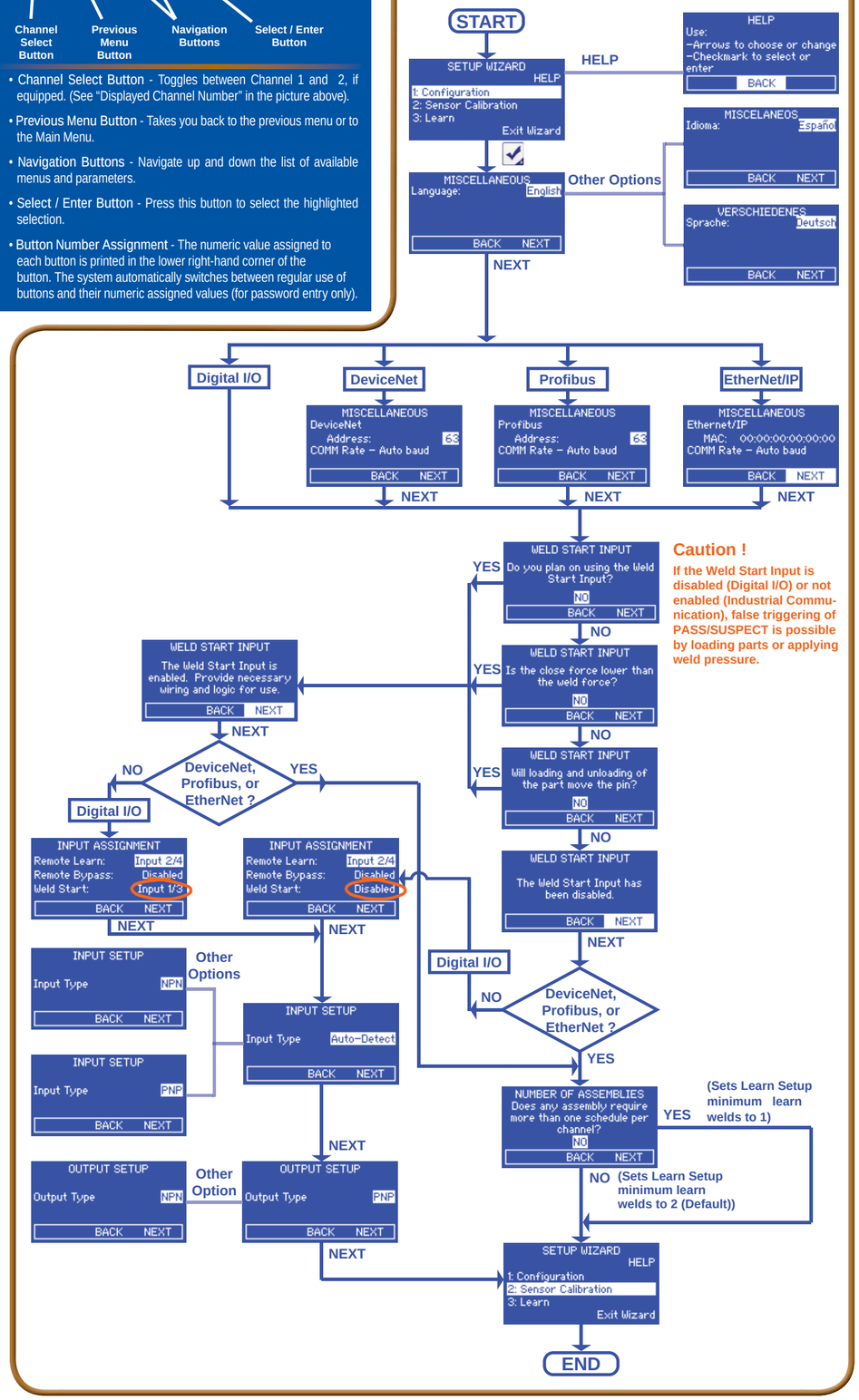
CenterLine (Windsor) Limited | 655 Morton Dr., Windsor, ON N9J 3T9 | P.O. Box 321187, Detroit, MI 48232-1187 | Toll Free: (800) 268-8330 | Canada: (519) 734-8330 | U.S.: (313) 961-3731 | Fax: (519) 734-2006 | Email: info@cntrline.com | www.cntrline.com

SMART ELECTRODE 2 - SETUP WIZARD



- Channel Select Button - Toggles between Channel 1 and 2, if equipped. (See "Displayed Channel Number" in the picture above).
- Previous Menu Button - Takes you back to the previous menu or to the Main Menu.
- Navigation Buttons - Navigate up and down the list of available menus and parameters.
- Select / Enter Button - Press this button to select the highlighted selection.
- Button Number Assignment - The numeric value assigned to each button is printed in the lower right-hand corner of the button. The system automatically switches between regular use of buttons and their numeric assigned values (for password entry only).

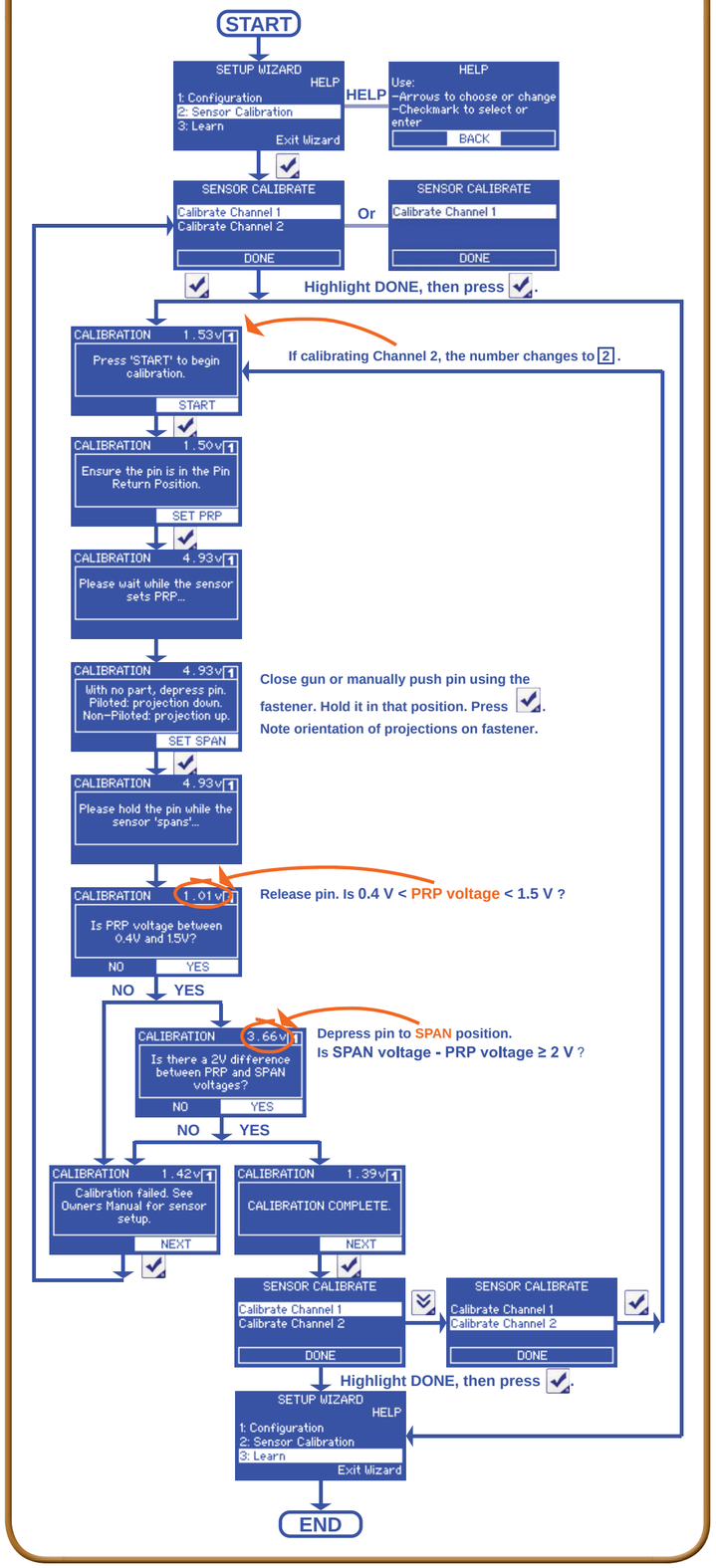
STEP 5 Configuration



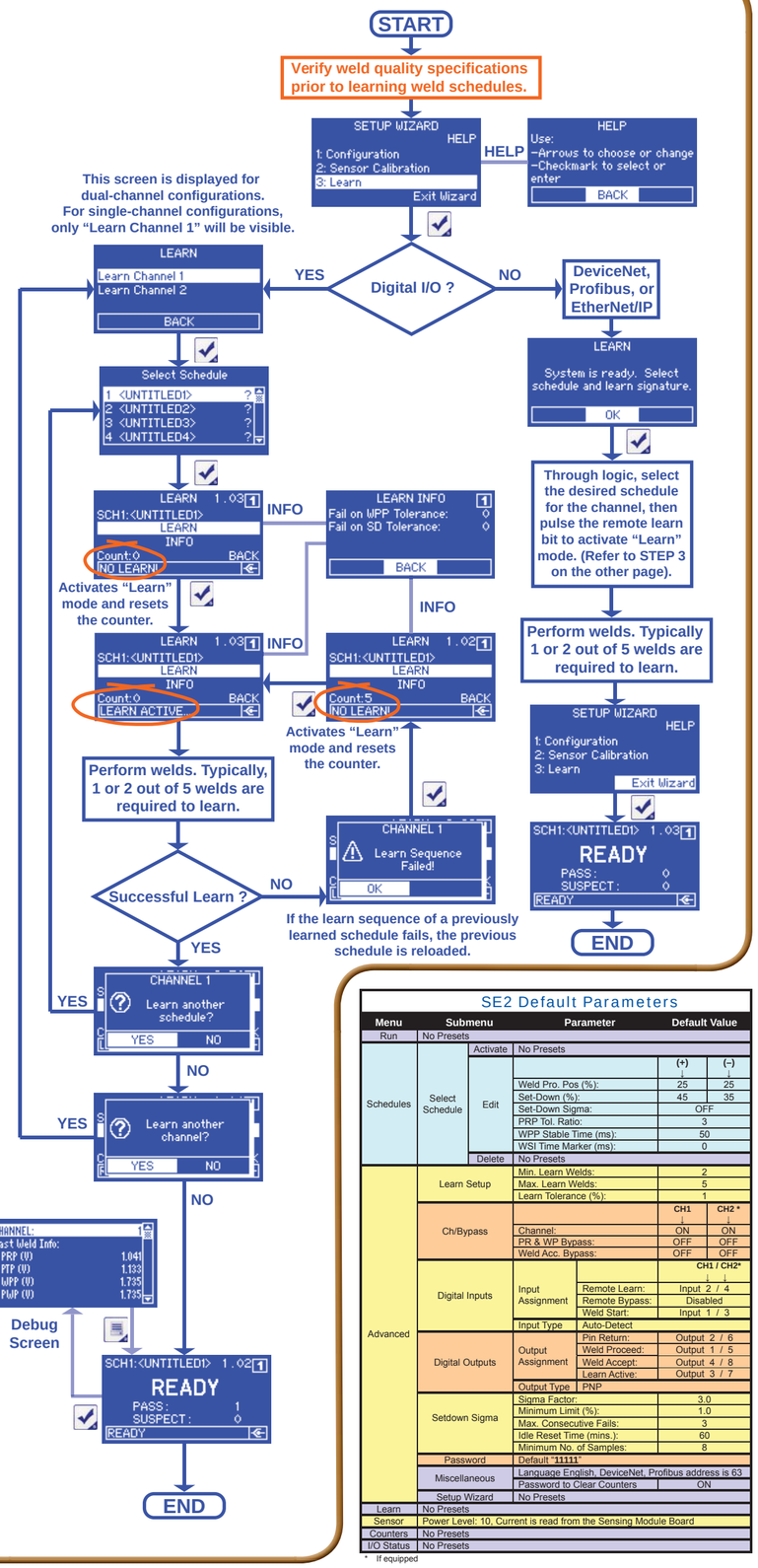
Caution !

If the Weld Start Input is disabled (Digital I/O) or not enabled (Industrial Communication), false triggering of PASS/SUSPECT is possible by loading parts or applying weld pressure.

STEP 6 Sensor Calibration



STEP 7 Learn



SE2 Default Parameters

Menu	Submenu		Parameter	Default Value	
Run	No Presets				
Schedules	Select Schedule	Activate	No Presets		
		Edit		(+)	(-)
			Weld Pro. Pos (%):	25	25
			Set-Down (%):	45	35
			Set-Down Sigma:	OFF	
			PRP Tol. Ratio:	3	
			WPP Stable Time (ms):	50	
			WSI Time Marker (ms):	0	
		Delete	No Presets		
Advanced	Learn Setup		Min. Learn Welds:	2	
			Max. Learn Welds:	5	
			Learn Tolerance (%):	1	
	Ch/Bypass			CH1	CH2 *
			Channel:	ON	ON
			PR & WP Bypass:	OFF	OFF
			Weld Acc. Bypass:	OFF	OFF
	Digital Inputs			CH1 / CH2*	
		Input Assignment	Remote Learn:	Input 2 / 4	
			Remote Bypass:	Disabled	
			Weld Start:	Input 1 / 3	
		Input Type	Auto-Detect		
	Digital Outputs	Output Assignment	Pin Return:	Output 2 / 6	
			Weld Proceed:	Output 1 / 5	
			Weld Accept:	Output 4 / 8	
			Learn Active:	Output 3 / 7	
		Output Type	PNP		
	Setdown Sigma		Sigma Factor:	3.0	
			Minimum Limit (%):	1.0	
			Max. Consecutive Fails:	3	
			Idle Reset Time (mins.):	60	
			Minimum No. of Samples:	8	
	Password		Default "11111"		
	Miscellaneous		Language English, DeviceNet, Profibus address is 63		
			Password to Clear Counters	ON	
	Setup Wizard		No Presets		
Learn	No Presets				
Sensor	Power Level: 10. Current is read from the Sensing Module Board				
Counters	No Presets				
I/O Status	No Presets				

* If equipped